

NATURAL HISTORY MISCELLANEA

Published by

The Chicago Academy of Sciences

Lincoln Park-2001 N. Clark St. Chicago, Illinois 60614 U.S.A.

No. 205

June 1, 1979

Distribution of the Dusky Salamander, *Desmognathus fuscus* (Green), in I l l i n o i s

RONALD A. BRANDON¹ AND JAMES E. HUHEEY²

The dusky salamander, *Desmognathus fuscus*, is one of the rare members of the Illinois vertebrate fauna. The range of this salamander common in other parts of eastern United States reaches through western Kentucky and into extreme southern Illinois. Because it barely enters the state, *D. fuscus* was placed on the Illinois Department of Conservation's list of rare and endangered species (Kenney, 1978). Until recently, it was known with certainty from only one locality near Olmsted, Pulaski County (Stein, 1954; Rossman, 1958), but other, questionable, records have been discussed by Smith (1961). Illinois populations have been under intensive investigation for the past four years. This report lists 10 additional localities from which recently collected voucher specimens are available and discusses the range in the state.

Until the fauna of Illinois had been surveyed in some detail, dusky salamanders were thought to occur widely over the state (Davis and Rice, 1883; Garman, 1892). All records prior to 1954, however, were apparently based on misidentifications or erroneous locality data (Smith, 1961). For example, one specimen (USNM 3823) from "Cook Co., Ill" is identifiable as *Desmognathus quadramaculatus*, a species of the southern Appalachian Mountains (Smith, 1961). Yarrow (1882) listed three specimens from "Mount Carmel, Ill." (USNM 12058). A specimen labeled USNM 12058 is a subadult *Ambystoma texanum*; other specimens (USNM 12050, 12056, 12058-60), apparently part of the same series, are also identifiable as *A. texanum* (R. Crombie, personal communication). Specimens listed by Dunn (1926) from "Normal, Illinois" (MCZ 2054, 2056) are *D. fuscus* (Smith, 1961) but surely were not collected at Normal. According to MCZ personnel, these specimens have been skeletonized and can no longer be located, so we have not seen them. Hankinson's (1915) record for Coles County was probably based on larval *Eurycea* sp. (Dunn, 1926; Smith, 1961).

¹Department of Zoology, Southern Illinois University at Carbondale, Carbondale, Illinois 62901

²Department of Chemistry, University of Maryland, College Park, Maryland 20742

Smith (1948) reported the first plausible locality record for the state, "near Aldredge (sic), Union County, Illinois," on the basis of two specimens (UIMNH 1813-1814) collected in 1935. Subsequent attempts, all unsuccessful, to find specimens in the Pine Hills area (Rossman, 1960; Smith, 1961) made it seem unlikely that those specimens bore correct locality data. Despite the inclusion of Union County on Conant's (1975) recent range map of this species, *D. fuscus* does not appear to occur there, nor anywhere else north of the Cache River. An unpublished record of *D. fuscus* at Pine Hills was based on larval specimens of *Eurycea lucifuga* in the collection of the Department of Biology, University of Wisconsin, Stevens Point. In 14 years of occasional field work at Pine Hills (1.6 miles east of Aldridge) and four summers of intensive work there, one of us (RAB and students) has never found *D. fuscus*.

The first verifiable record of *D. fuscus* in Illinois, documented by continuing observations and preserved voucher specimens, was for the deeply dissected wooded ravines along the Ohio River north of Olmsted, in Pulaski County (Stein, 1954). Until recently, this remained the only verifiable locality. The largest known expanse of *D. fuscus* habitat is now protected here within Chestnut Hills Nature Preserve, where dusky salamanders are abundant. Dyrkacz' (1974) report that the species was extirpated in the state was in error, as Morris (1976) has pointed out.

During the past four years, we have systematically searched in Pulaski and Massac counties, south of the Cache River and Bay Creek, and in areas immediately north of these streams for populations of *D. fuscus*. Likely sites (wooded headwater ravines) were located on topographic quadrangle maps or aerial photographs and then visited by a field party. All sites examined were plotted within township and in reference to drainage. Sites where dusky salamanders were found were photographed, and a few voucher specimens collected.

Ten additional populations of the dusky salamander are now documented for Illinois, all within an area of approximately 40 square miles. All known localities are confined to 12 sections of two adjacent townships of Pulaski County, and are isolated geographically between the Cache and Ohio rivers and west of Post Creek Cutoff. All populations are in small streams draining an island of Tertiary upland surrounded by Pleistocene terraces and alluvial sediments, at the northern edge of the Mississippi Embayment (Alexander and Prior, 1968; Fisk, 1944). Populations have been found all around the periphery of this section of Tertiary upland, in ravines draining directly into the Ohio River (near Olmsted), into tributaries of the Ohio River (between Olmsted and Mounds), and into tributaries of the Cache River (western and northern localities). All localities are along the edge of Pliocene Lafayette Gravel deposits, in ravines eroded into Pleistocene deposits or older deposits of Eocene, Paleocene and Cretaceous materials (Figure 1; Pryor and Ross, 1962).

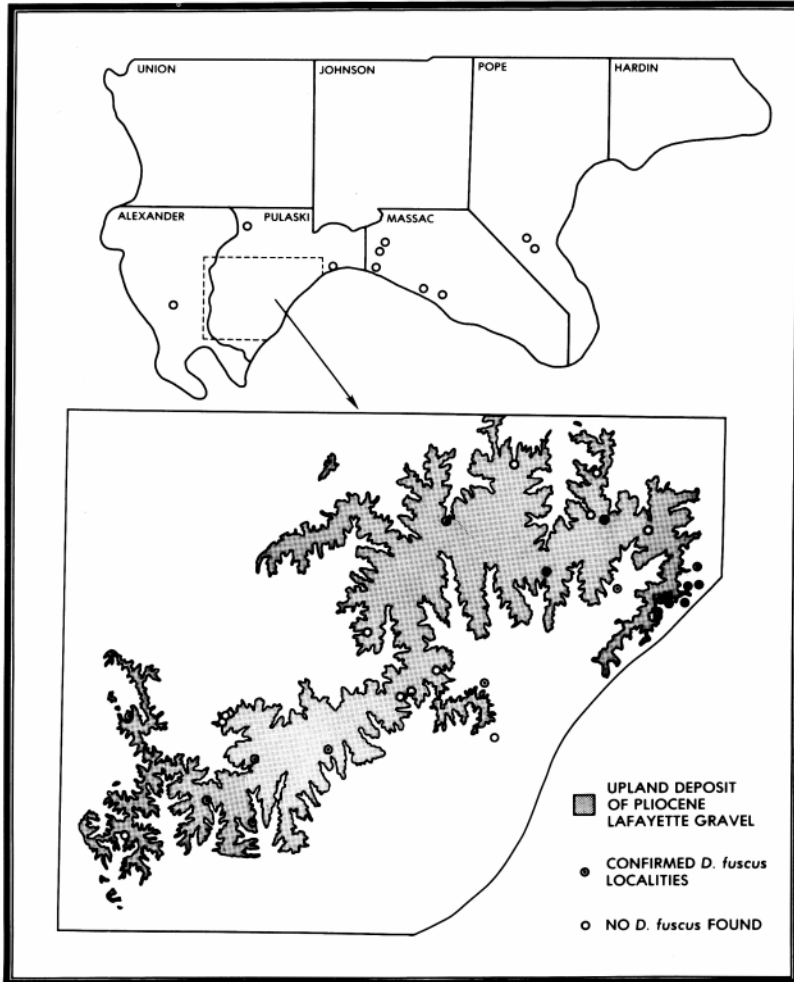


Figure 1. Confirmed localities for *Desmognathus fuscus* in Illinois.

Seep springs along the ravines provide a continuous supply of cool water, even during hot and dry southern Illinois summers. Most populations seem to be small, relictual, limited to wooded headwaters, and in immediate danger of extirpation from habitat modification (deforestation, stream siltation, livestock damage). The tenuous existence of populations outside Chestnut Hills Nature Preserve is illustrated by the following example. The second largest population we know of (judged by size of habitat and

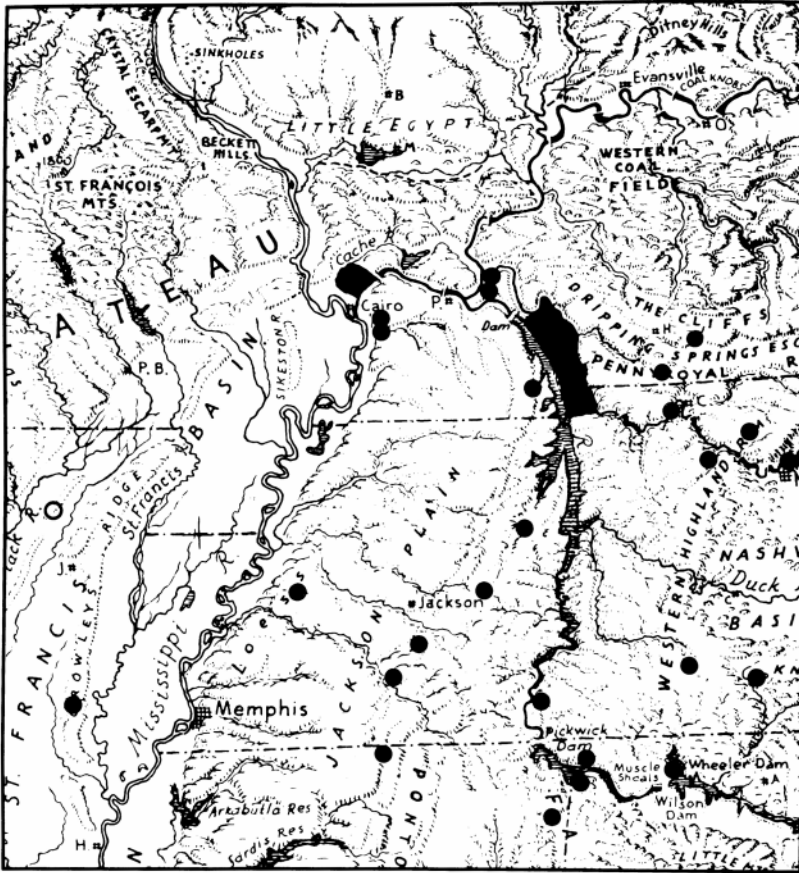


Figure 2. *Desmognathus fuscus* localities immediately adjacent to southern Illinois, plotted on a portion of "Landforms of the United States," by Erwin Raisz, 6th revised edition, 1957.

density of animals) was nearly destroyed during summer 1977 by the complete clearing of land immediately adjacent to the spring and spring run that leads to an entrenched bottomland creek lacking *D. fuscus*. Little additional disturbance could destroy the habitat completely. Fortunately for the salamanders, most of the cleared trees and shrubs were piled over the spring run (keeping it heavily shaded) and the spring head itself (at the base of a hill) was left undisturbed. Whether or not this population will survive, as it survived previous clearing in the 1930's, remains to be seen. Aerial photographs taken in 1938 clearly show the land was cleared then along the spring run; a series of subsequent photographs (1950,

1956, 1965, 1971) shows the gradual return of forest cover. Another site has long been used as a local dump, and the stream is full of old cans, glass, concrete blocks, a refrigerator, and other cultural artifacts; nevertheless, salamanders are relatively abundant here. At what appear to be marginal sites (young trees only, heavily silted streams, little surface water) few animals are found.

How dusky salamanders reached Illinois and how they became restricted to their present distribution are questions on which we can only speculate. At the beginning of the Pleistocene, the species may have occurred all along the northern boundary of the Mississippi Embayment. The nearest known Recent populations are along the Embayment border in western Kentucky and western Tennessee, and on Crowley's Ridge in northeastern Arkansas, near the western border of the Embayment (Figure 2). Populations may have occurred in Illinois south of the present Cache River Valley even then, but the restricted present range is more difficult to explain if they did. The species may have entered the state more recently, as the Cumberland, Tennessee, Ohio and Mississippi rivers evolved during the late Pleistocene. If, as it appears now, the species does not presently occur north of the Cache River nor in comparable Tertiary uplands to the east (from Grand Chain eastward to Bay City), then it may have entered the state from the south, become isolated in the Tertiary uplands between Olmsted and Mounds, between the newly formed Ohio River and the nearly abandoned Cache Valley, and has not spread further because of major rivers or valleys to the west and north and Pleistocene terraces to the east between Olmsted and Grand Chain. In a similar fashion, populations on Crowley's Ridge, Arkansas, were apparently isolated as the Mississippi and Ohio rivers excavated Tertiary sediments on both sides of the ridge and subsequently surrounded it with postglacial alluvium (Fisk, 1944; Arkansas, Dept. of Planning, 1974). Additional distributional information from western Kentucky and western Tennessee may help in understanding the zoogeographical history of Illinois populations.

LITERATURE CITED

- Alexander, C. S. and J. C. Prior. 1968. The origin and function of the Cache Valley, southern Illinois. pp. 19-26. *In* R. E. Bergstrom, ed., *The Quaternary of Illinois*. Special Publication No. 14, University of Illinois College of Agriculture, Urbana.
- Arkansas, Department of Planning. 1974. Arkansas natural area plan, Appendix: A preliminary ecological study of Crowley's Ridge, p. 213-241. Little Rock, 248 pp.
- Conant, R. 1975. A field guide to reptiles and amphibians of eastern and central North America. Houghton Mifflin Co., Boston, 429 pp.
- Davis, N. S. and F. L. Rice. 1883. List of Batrachia and Reptilia of Illinois. *Bull. Chicago Acad. Sci.* 1(3):25-32.

- Dunn, E. R. 1926. The salamanders of the family Plethodontidae. Smith College, Northampton, Massachusetts, 441 pp.
- Dyrkacz, S. 1974. Rare and/or endangered species of Illinois: reptiles and amphibians. Bull. Chicago Herpetol. Soc. 9(1-2):15-16.
- Fisk, H. N. 1944. Geological investigations of the alluvial valley of the lower Mississippi River. Mississippi River Commission, War Dept., U. S. Army Corps of Engineers, Vicksburg, 78 pp.
- Garman, H. 1892. A synopsis of the reptiles and amphibians of Illinois. Bull. Illinois State Lab. Nat. Hist. 3:215-388 + 8 unnumbered.
- Hankinson, T. L. 1915. The vertebrate life of certain prairie and forest regions near Charleston, Illinois. Bull. Illinois State Lab. Nat. Hist. 11:281-303.
- Kenney, D. 1978. Administrative Order, State of Illinois Dept. of Conservation. Article CXXXVIII—Illinois list of endangered and threatened vertebrate species issued in accordance with provisions of section 337 of the Illinois Endangered Species Protection Act.
- Morris, M. A. 1976. New herpetological records for Illinois. Herpetol. Rev. 7(3):126-127.
- Pryor, W. A. and C. A. Ross. 1962. Geology of the Illinois parts of the Cairo, LaCenter, and Thebes quadrangles. Illinois State Geol. Surv. Circular 332:1-39 + 2 plates.
- Rossmann, D. A. 1958. A new race of *Desmognathus fuscus* from the south-central United States. Herpetologica 14:158-160.
- . 1960. Herpetofaunal survey of the Pine Hills area of southern Illinois. Quart. Jour. Florida Acad. Sci. 22(4):207-225.
- Smith, P. W. 1948. Noteworthy herpetological records from Illinois. Nat. Hist. Misc., Chicago Acad. Sci. no. 33:1-4.
- . 1961. The amphibians and reptiles of Illinois. Illinois Nat. Hist. Surv. Bull. 28(1), 298 pp.
- Stein, H. A. 1954. Additional records of amphibians and reptiles in southern Illinois. Amer. Midl. Nat. 5(1):311-312.
- Yarrow, H. C. 1882. Check list of North American Reptilia and Batrachia, with catalogue of specimens in U.S. National Museum. Bull. U.S. Nat. Mus. 24, 249 pp.

ACKNOWLEDGMENTS

Our work has been encouraged by the Illinois Department of Conservation, the Illinois Nature Preserves Commission, and the Illinois Endangered Species Protection Board; and supported financially by the Southern Illinois University at Carbondale Office of Research Development and Administration. Mr. K. Andrew West personally aided the work with advice, interest, and assistance in obtaining the necessary permits; his contribution is gratefully acknowledged. For help in the field work we thank Doris M. Brandon, Timothy E. Brophy, Brooks M. Burr, Kenneth R.

Kaemmerer, George M. Labanick, Mark Rathke, Steve Reilly, K. Andrew West and Edward Zalisko. For the loan of preserved specimens we are grateful to Mark Bloesing and Roger Reason, Brookfield, Illinois; Ronald I. Crombie, National Museum of Natural History (USNM); Donald F. Hoffmeister, University of Illinois Museum of Natural History (UIMNH); Garry Knopf, University of Wisconsin, Stevens Point (UWSP); Peter Meylan, Florida State Museum (FSM); Jose P. Rosado, Museum of Comparative Zoology (MCZ); and Philip W. Smith, Illinois Natural History Survey (INHS). Roger W. Barbour (University of Kentucky), Max A. Nickerson (Milwaukee Public Museum), Douglas A. Rossman (Louisiana State University), and David Snyder (Austin Peay State University) have been helpful in responding to various requests for information.

Voucher specimens.—*Each* new locality is documented by at least 2 preserved specimens, one population by as many as 141 specimens. Of a total of 291 specimens collected outside of Chestnut Hills Nature Preserve, 58 are hatchling larvae in two clutches. All specimens are deposited in the National Museum of Natural History (USNM 210133-210199, 210673-210822, 210824-210828).